AMENDMENTS TO THE SPECIFICATION

Please substitute the following paragraphs for the similarly numbered paragraphs in the application:

[0005] Current bone plates are difficult [[~~too~~]] to place in the desired location because they do not enable the surgeon the ability to simultaneously view the fusion site with the plate in position before securing the plate. This shortcoming is compounded because the tissue environment is difficult to view and presents limiting access to the seam or fusion site.

[0006] In many bone plate system applications, it is relatively difficult to secure tightly the bones relative to one another for fusion. As an example, when spinal vertebrae are secured for fusion, bone graft is placed between the vertebral sections. A bone plate is then secured with screws across the fusion site to secure the vertebrae `along the spinal axis. It can be difficult to compress properly the vertebral sections because the surgical procedure is performed while the patient is lying prone under ~~anaesthesia~~ anesthesia. However, such a spinal procedure would benefit from the compressive force of gravity. That is, when the patient is allowed to stand erect, gravity is able to compress the vertebral sections and the graft material to benefit healing. In order to [[~~,~~]] enable this, however, the bone plate must allow a slight compression of, or shortening of the distance between, the securing screws in the direction along the spinal axis.

[0036] Preferably, the screws 12, 14 are bone[[~~s~~]] screws mounted anteriorly or laterally in the vertebrae. The bores 32,_34 are sized and shaped to allow the screws 12, 14 polyaxial movement so that they can be oriented relative to the plate as dictated by the structure of the vertebrae to effectively secure into such vertebrae, or in the orientation preferred or deemed proper by the surgeon. As illustrated, FIG. 3, for example, depicts the screws 12, 14 at an orientation relative to the bone plate 10 defined by an ~~induded~~ included angle .alpha. between the respective longitudinal axes 12a and 14a of the screws 12, 14.

[0041] The number, combination and position of dynamized and non-dynamized bores is not limited by the present invention. For instance, as illustrated in FIG. 16, a plate 100 is depicted with a pair of adjacent dynamized bores 132a for a first bone section, a pair of adjacent dynamized bores 132b for a second bone section, and a pair of non-dynamized bores 134 for a third bone section. As an example of the use of plate 100, three (or more) vertebrae may be secured in a larger spinal fusion procedure, the results of which would benefit from gravitational compression as discussed. Accordingly, dynamized screws and bores 132a, 132b, 134 ~~maybe~~ may be secured to a plurality of vertically aligned bones such that each of the bones and its attendant screw may adjust towards the other bones. By way of another example, as illustrated in ~~PIG.~~ FIG. 17, the non-dynamized holes can be situated between the dynamized holes. Furthermore, all of the holes can be dynamized or non-dynamized. Other configurations are contemplated and within the scope of embodiments of the present invention.

[0045] In the illustrated embodiment, the screw locks are collars 70 set into channels 74 (see FIGS. 8 and 9). As illustrated in FIGS. 6 and 7, the collars 70 are preferably C-ring collars with an inner surface 76. The collars 70 are substantially located within the recess 36, as illustrated in FIG. 8. The screw locks may be pre-set or pre-inserted so that, in the operating environment, the surgeon need only handle the plate 10 and the included screw locks as a single pre-assembled item. The inner surface 76 is preferably shaped to conform to the above-described partially spherical outer profile of the head 50 of the screws 12, 14. This enables the inner surface 76 to tightly engage and ~~damp~~ clamp against the outer surface 52 of the head 50 of the screw for locking the screw. This maximizes the contacting surface area between the collar 70 and screw heads 50 to enhance friction therebetween for rotation resistance. This also minimizes potential damage to the collar 70 and head 50 which could result in a less secure lock between the collar 70 and the head 50 and minimizes potential for shearing of pieces of the plate system that would contaminate the tissue environment.

[0046] As illustrated in FIG. 8, at least a portion of the partially spherical outer surface 52 engages the collar 70 and a lower portion of the bores 32, 34 of the plate 10. It is preferred that any portions of the plate 10 and collar 70 which contact the screw 12, 14 be closely mated to form a generally continuous contoured contact surface corresponding to the partially spherical outer surface 52. For example, as illustrated, the partially spherical surface 52 of the screw head 50 is contoured to generally correspond to the inner contour 32a of the bore 32 and the inner contour or surface 76 of the collar 70, when in a locked position. The same corresponding surface engagement is preferably with screws 14 and bore 34 and its locking collar 70, as well. However, it should be appreciated that, the head 50 and corresponding collar 70 of a screw set for dynamization, such as screw 12, does not necessarily have a full circumference of contact with the bore 32 as the major axis direction of the bore 32 provides for relative movement therealong. However, where there is contact between the bore 32 and the screw 12 and locking collar 70, a generally ~~dose~~ close mating of the contours is preferred, including when the screw 12 has been displaced to and is abutting the lower-most portion of the bore 32.

[0047] Alternatively, the bores 32, 34 of the plate 10 ~~maybe~~ may be shaped such that the head 50 abuts only the collar 70. For instance, the collar 70 may extend the axial length of head 50, may extend the axial length of the interior of the bores 32, 34, and/or may simply be utilized such that a gap (not represented) exists between the head 50 and the plate 10.

[0053] As alternative, the screws 12, 14 may have the screw lock, such as the collar 70, pre-set or attached to the screw 12, 14 (as opposed to pre-set in the plate 10). As described above, the inner surface 76 of the collar 70 has upper and lower edges 80, 81 smaller in diameter than the largest diametral annular portion 54 of the head, and the screw 12, 14 is mated accordingly within the collar 70. For this alternative, a surgeon may position the plate 10 in the desired position, and turn the screws 12, 14, including the collar 70, into the bones. As the collar 70

reaches the plate 10, the collar 70 may simply move into the ~~bore~~ top portion of the bore 32, 34 or be compressed in the radial direction in order to fit within the bore 32, 34. Once the collar 70 reaches the channel 74, the collar 70 should expand to fit in the channel 74 and be secure against unintentional axial movement. The inner diameter of the bore 32, 34 in the annular area immediately above the channel 74 in the axial direction may have a larger diameter than the diameter in the annular area immediately below the channel 74 so that the collar 70 being inserted does not pass by the channel 74. In any event, the annular lip surrounding the entrance into the bores can be rounded or tapered to assist in the insertion of the collar into the bores.

[0056] A camming action locks the collar 70 within the channel 74. In a preferred form, the channel 74 has an arcuate circumferential inner surface 75, which ~~maybe~~ may be non-uniform. The collar 70 also may have a varying outer diameter, such as depicted in FIGS. 7 and 18, formed by the lower step portion 108. The collar 70 may be rotated in order to compress the collar 70 within the channel 74 until reaching a locked position. The locked position may be defined by having a bump or boss within the channel beyond which the collar 70 may not rotate, or beyond which the collar 70 must rotate in order to be in a lock position but which restricts return (unlock) rotation. In addition, as depicted in FIGS. 7 and 18, the lock position may be defined by a flat 106 or 206 of the lower step portion ~~or 206~~ mating with a flat 110 in the channel 74.

[0057] As illustrated in FIG. 7, the lower step 108 of the collar 70 has a first diametral dimension L1 and a second diametral dimension L2 wherein the dimension L1 is aligned with the Y (vertical) direction and dimension L2 is aligned with the X (horizontal) direction, as set by the illustrated coordinate system. In the present depiction, the gap 90 is aligned with dimension L1. However, it is preferred that the gap 90 is not positioned so as to bind with the inner surface of the channel 74 in the [[-]] open or locked positions, instead being 1/4.pi. radians displaced (clockwise) from the illustrated position at the L1 dimension, which is depicted in FIG. 18.

[0059] As illustrated in FIGS. 7 and 18, the outer periphery of the lower step portion 108 of the collar 70 has a non-circular arcuate shape forming a camming surface for the collar 70. As the collar 70 is rotated, a camming action compresses the collar 70 against an interior surface of the channel 74 until the collar 70 reaches the secure or locked position when flats 106, 206 abut similarly contoured portions or flats 110 of the channel 74. Once secured, the collar 70 would have to be rotated in an opposite direction in order to undo and release the cam lock engagement to unlock the collar 70 and free the screw for intentional removal. Because of the flats 106, 206, a surgeon would have to deliberately use the tool to rotate the collar 70. As long as the collar 70 is locked, the screws 12, 14 are unable to rotate or change their orientation relative to the plate, and are unable to back-out of the bone structure.

[0067] As also discussed above, the movement of the dynamized screws 12 in the dynamized bores 32 should not ~~effect~~ affect the orientation of the screws 12 relative to the plate 10. That is, when vertebral sections compress, these sections should do so generally linearly along the spine. If the compression is not linear, the vertebral sections will move out of proper alignment, which can lead to undesired pressure on the nervous system portion of the spinal column, with uneven pressure on the end plates of the vertebral sections themselves, with incorrect healing by graft material, and with pressure on the plate 10 and the screws 12, 14 themselves. The screws 12, 14 used herein are preferably polyaxial, the shank 40 of each having a diameter smaller than the diameter of the head 50. Without locking the polyaxial screw in its proper orientation once driven, the polyaxial screw would be permitted to change its orientation relative to the plate when allowed to move in a dynamized hole. Accordingly, the screw locks, such as the collar 70, allows the polyaxial screws to be driven in a desired orientation relative to the plate, and then to be locked in that orientation by locking the screw locks 70. As the screw locks for the dynamized bores follow a precise linear path, the orientation of the locked dynamized screws is not altered when the vertebral sections compress.